



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/790,841

03/03/2004

Kong-Wei Cheng

3111-423

2491

7590 04/05/2007  
TROXELL LAW OFFICE PLLC  
5205 Leesburg Pike, Suite 1404  
Falls Church, VA 22041

EXAMINER

VJAYAKUMAR, KALLAMBELLA M

ART UNIT

PAPER NUMBER

1751

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
--	-----------	---------------

3 MONTHS

04/05/2007

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

**Office Action Summary**

Application No.

10/790,841

Applicant(s)

CHENG ET AL.

Examiner

Kallambella Vijayakumar

Art Unit

1751

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 03 March 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-13 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-13 is/are rejected.
- 7) ☒ Claim(s) 1,5,6,8,11 and 13 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 03/03/2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☒ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
  - 2) ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

Art Unit: 1751

#### **Detailed Action**

- Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.
- Claims 1-13 are currently pending with the application.

#### ***Oath/Declaration***

The oath or declaration is defective. A new oath or declaration in compliance with 37 CFR 1.67(a) identifying this application by application number and filing date is required. See MPEP §§ 602.01 and 602.02.

The oath or declaration is defective because: It does not identify the citizenship of each inventor. It is missing the citizenship of Huang, Jau-Chin.

#### ***Claim Objections***

Claims 1, 5-6, 8, 11 and 13 are objected to over the following informalities. The claims 1, 5-6, 8, 11 and 13 use a ":" in between the words that is improper. Applicants can overcome this objection by removing ":" in these claims. Further, claims 5-6, 8 and 11 recite the limitation of several groups in improper Markush format. Applicants are suggested to rewrite this as "selected from a group consisting of" to overcome this objection.

#### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter, which the applicant regards as his invention.

Claims 1, 3-4 and 10 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The term "unevenly" in Claims 1 and 10 is a relative term, which renders the claim indefinite. The term "unevenly" is not defined by the claims, the specification does not provide a standard for

Art Unit: 1751

ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably appraised of the scope of the invention. If ten parameters make a material "evenly" how many parameters need to be met to make the instant material "unevenly."

The term "predetermined" in Claims 3 and 4 is a relative term, which renders the claim indefinite. The term "predetermined" is not defined by the claims, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably appraised of the scope of the invention.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

1. Claims 1-2, 4, 8, 10 and 12 are rejected under 35 U.S.C. 102(b) as anticipated by Kitamura et al (US 4,242,302).

The prior art teaches a gas detector comprising a coating of TiO<sub>2</sub> powder over a platinum wire with a thickness of 0.05 mm forming an element. Each particle of TiO<sub>2</sub> in contact with the Pt substrate constitutes a photocatalytic electrode that meets the limitation of Claims-1 and 8. With regard to claim-2, the prior art teaches exposing the element to gaseous vapors and the diffusion of the vapors over the substrate and the oxide will meet the limitation of reactant contacting the substrate/carrier and

Art Unit: 1751

photocatalyst alternatively. With regard to claim-4, the prior art teaches TiO<sub>2</sub> coating on a wire/bar. With regard to the claim-10, the prior art teaches coating the wire with the oxide from a paste <adhesive coating>, where in all the surfaces of the wire are coated and meets the second surface being unevenly coated in the claim. With regard to the claim-12, the prior art teaches coating the wire with the oxide from a paste, and the examiner asserts that the prior art composition will either be same or substantially same as that produced by the instant claimed process step. All the limitations of the instant claims are met.

The reference is anticipatory.

2. Claims 1-5, 8-9 and 13 are rejected under 35 U.S.C. 102(e) as being anticipated by Hsi. (US 2004/0081596).

Hsi teaches an air purifier device comprising a TiO<sub>2</sub> coated wire gauze filter between an input port and an output port, and irradiated with an UV light, and the air purifier mounted inside the case body, to purify the air passing through the filter (Abstract, Fig-4, Para 0016-0017). Each particle of TiO<sub>2</sub> in contact with the wire gauze constitutes a photocatalytic electrode that meets the limitation of Claims 1, 3-4 and 8. With regard to claim-2, the prior art teaches exposing the filter to contaminated air, and the diffusion of the air with contaminants over the substrate and the oxide will meet the limitation of reactant contacting the substrate/carrier and the photocatalyst alternatively. The circular and rectangular shaped filters meet the limitation of claim-5. With regard to claim-9, the prior art teaches coating the inner walls of the rectangular frame. With regard to claim-13, the prior art teaches a wire gauze device containing a photocatalyst placed inside an air purifier device employing an UV light, and the examiner asserts that this will be either same or substantially same as that produced by the applicant's method step in claim-12. All the limitations of the instant claims are met.

The reference is anticipatory.

3. Claims 1-2, 6-8 and 11-13 are rejected under 35 U.S.C. 102(b) as being anticipated by Carmignani et al (US 6,524,447).

Art Unit: 1751

Carmignani et al teach an apparatus and a method for the purification and ultrapurification of water containing open cell, three dimensionally reticulated, fluid permeable semiconductor unit, and containing a photocatalyst and a light source (Abstract, Fig-1A and 1B). The photocatalysts included semiconducting oxides such as TiO<sub>2</sub> (Cl-2, Ln 5-11; Cl-7, Ln 4-20). The substrates included metallic aluminum or copper and semiconducting titania (Cl-5, Ln 41-53, 60-66; Cl-6, Ln 47-50). The photocatalyst was bonded to the conductive substrate by methods such as sol-gel (Cl-6, Ln 11-18). Each particle of TiO<sub>2</sub>/catalyst in contact with the reticulated substrate forms a photocatalytic electrode. The prior art teaches exposing the filter to contaminated water, and the diffusion of organic contaminants over the substrate and the oxide catalyst will meet the limitation of reactant contacting the substrate/carrier and photocatalyst alternatively (Fig-3, Fig-5). The photoreactor in Fig-1B will meet the limitation of Claim-11. With regard to claims 12-13, the prior art teaches coating a photocatalyst over the conductive substrate by sol-gel, and a reactor containing the catalyst and a light source. All the limitations of the instant claims are met.

The reference is anticipatory.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Art Unit: 1751

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

1. Claims 6, 10 and 12-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hsi. (US 2004/0081596) in view of Chung et al (US 7,166,323).

The disclosure on the composition of the gas sensor by Hsi as set forth in rejection-2 under 35 USC 102(e) is herein incorporated.

The prior art is silent about the nature of the metal used as the substrate for the catalyst coating per claim-6 or a carrier having second surface per claim-10 or a method of coating the catalyst over the metal substrate per the claim 12.

In the analogous art, Chung et al teach coating TiO<sub>2</sub> catalyst over metallic mesh by sol-gel over substrates made of metals such as steel or aluminum (Cl-3, Ln 47-54; Cl-6, Ln 4-10; Cl-7, Ln 55-67).

It would be obvious to a person of ordinary skilled in the art to combine the prior art teachings to substitute the metal mesh of Hsi with steel mesh of Chung et al as functional equivalent and/or coat the substrate by sol-gel or washcoat process with reasonable expectation of success, because combined prior art is suggestive of the claimed composition and the process of making the structure, and the structure will meet the limitation of the claimed apparatus in claim-13.

With regard to the claim-10, the sol-gel coating of the wire with the TiO<sub>2</sub> catalyst will coat all the surfaces of the wire that will meet the limitation of a second surface being unevenly coated in the claim. Alternatively, It would have been obvious to a person of ordinary skilled in the art to add a second carrier in a photocatalytic reactor as a choice of design to optimize the residence time in a reactor as a function

Art Unit: 1751

of air flow through the filters because such an optimization is well known in reactor design (See Goswami, US 5,835,840; Cl-2, Ln 56-58).

2. Claim 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hsi. (US 2004/0081596).

The disclosure on the composition of the gas sensor by Hsi as set forth in rejection-2 under 35 USC 102(e) is herein incorporated.

The prior art is silent about the different shapes of the carrier per claim-11.

However, the prior art teaches using the mesh with circular shape and it would have been obvious to a person of ordinary skilled in the art to optimize the air purifier arrangement to fit this element in a cylindrical/circular ducts as a choice of design of the shape of the apparatus with reasonable expectation of success.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kallambella Vijayakumar whose telephone number is 571-272-1324. The examiner can normally be reached on 8.30-6.00 Mon-Thu, 8.30-5.00 Alt Fri.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Douglas McGinty can be reached on 571-272-1029. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.



Art Unit: 1751

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

KMV  
March 27, 2007.

A handwritten signature in black ink, consisting of stylized initials followed by a long horizontal line.

Patent Examiner